



## Marvair<sup>®</sup> 12V DC Air Conditioners Model SMB05ACP

### Questions and Answers on the SMB05ACP 12V DC Air Conditioner

#### 1. What is the model SMB05ACP?

The SMB05ACP is an air conditioner designed for cooling small cabins on boats. It extracts heat from the cabin air and transfers it via a refrigerant circuit to water. What makes the unit different from other air conditioners is that it is designed to operate on 12 volt DC (Direct Current) electricity. Direct current is the electricity produced by batteries, engine alternators and solar panels.

#### 2. How much cooling will the unit produce?

The cooling capacity of marine air conditioners are typically rated by BTUHs. The nominal cooling capacity of the SMB05ACP is approximately 5,000 BTUH – about the same as a small window air conditioner. However, like other water to air units, the actual cooling capacity will vary depending upon water and air temperatures. The cooler the water entering the unit or the warmer the cabin air entering the unit, the more cooling capacity the unit has.

In addition to cooling, the air conditioner also acts a dehumidifier by removing moisture from the air.

#### 3. How long will the air conditioner run?

The run time of the air conditioner depends upon the number and type of batteries. With two deep cycle 6 volt golf cart batteries in series, the unit will operate continuously for five hours. However in most instances, the air conditioner does not run continuously, but cycles on & off when the set point of the thermostat reached. Assuming that the air conditioner has a 75% duty cycle (the air conditioner operates 45 minutes each hour), the air conditioner will operate 6 ¼ hours. With four, deep cycle 6 volt batteries in series-parallel the unit will operate continuously for over eight hours. With a 75% duty cycle, the air conditioner will operate for 10 hours.

#### 4. Will the unit reverse cycle and provide warm air?

No. The SMB05ACP only provides cooling and dehumidification.

#### 5. How do I know if the SMB05ACP has sufficient cooling capacity for my boat?

Contact your Marvair marine dealer. He can calculate the cooling requirement of the room and determine if the unit is right for you.

#### 6. What is the power consumption of the unit and the required water circulating pump?

The SMB05ACP, including the pump, draws a nominal 30 amps. Like the cooling capacity, the actual amp draw is affected by the air temperature and the water temperature. Lower water and air temperatures mean reduced amp draw. Also, the lower the actual battery voltage due to low voltage in the batteries or voltage drop in the wires from the battery to the air conditioner will cause a reduction of cooling capacity and lower current draw. As with any air conditioner, proper sizing of the power wires is critical to the proper operation of the unit.

#### 7. What is the difference in the SMB05ACP and using a conventional air conditioner and an inverter?

The key difference is the compressor. The SMB05ACP uses a high efficiency brushless DC compressor rather than a conventional compressor. This allows the unit to operate directly from DC power and an inverter is not required

To operate a conventional air conditioner off a DC power supply, an inverter is required. An inverter converts AC power to DC power, but is typically only 70% to 80% efficient. The other 20% to 30% of the energy is converted to heat. If the inverter is located in the space that is to be cooled, this adds to the cooling requirement. In addition, this loss must be taken into account when sizing the DC power source.

The second difference is in the start up of a conventional AC compressor. At start up, an AC compressor draws 5 to 6 times its nominal running amps. This means that the inverter must be sized to handle this start up current. However, oversizing the inverter for the start up current means that when the unit is running, the inverter is oversized and less efficient. The inverter also takes up valuable storage space on board.

#### **8. What are the installation requirements?**

Except for the electrical source, the installation of the SMB05ACP is the same as any water to air marine type air conditioner. Whenever the unit is operating, 2.1 GPM (8 L/m) must be provided to the unit. A thermostat on the wall senses cabin temperature and cycles the unit ON and OFF depending upon the set point temperature. A method of disposing of the condensate produced by the unit must be provided.

#### **9. Can the cool, dry air be ducted?**

Yes, the SMB05ACP has a single inlet centrifugal type blower that allows the conditioned air to be ducted. In addition, most people are surprised at how quiet the blower is. Please consult your Marvair marine dealer for optimizing your duct layout and design.

#### **10. What maintenance is required?**

Since the unit is a complete package system, field charging of refrigerant should never be required. Checking and changing/cleaning the air filter whenever it is dirty, checking/cleaning the sea water strainer and periodically making sure that the condensate pan and line are free from obstructions are the only required maintenance items.

#### **11. How long will the unit last?**

The SMB05ACP is designed for years of trouble free operation. The condensate pan is constructed of type 316 stainless steel. The evaporator coil is dipped in polyester enamel and is rated for 1,000 hours salt spray test. With proper maintenance, the unit should last as long a residential refrigerator.

#### **12. DC power can fluctuate considerably. What special protection is built into the unit?**

The compressor has over and under voltage protection (9 to 17 volts), over current protection (45 amps), locked rotor and thermal protection. The blower motor has over and under voltage protection (9 to 17 volts), over current protection (27 amps), locked rotor and thermal protection. In addition, the unit has polarity protection.

#### **13. Do I need any other controls?**

Battery manufacturers recommend that batteries should be depleted to, but not beyond, 50% of their 20 hour current rating. This discharge level is the typical maximum depth of discharge to maximize battery life and battery performance. To optimize the performance of the batteries, a shut off circuit with a bypass switch is recommended. The shut off circuit detects when the voltage drops to 11.0 volts and at that voltage, turns the air conditioner off. When the voltage rises to 12.5 volts, the air conditioner can resume operation. The bypass switch is for the person that does not care about battery life and wants the air conditioner to operate regardless of the voltage.

#### **14. What is the refrigerant used in the unit? Is this acceptable for use in Europe?**

The SMB05ACP uses R134a refrigerant. R134a is non-ozone depleting, environmentally friendly and acceptable for use in Europe.

#### **15. Where can I purchase Marvair's marine units?**

In the US, contact Marvair at 1-888-726-2734 or send us an email at [marinesales@airxcel.com](mailto:marinesales@airxcel.com) for the name of your nearest Marvair Marine dealer. In the UK, Europe or the Middle East, contact Marvair at +44 1202 606 405 or by email at [sales@marvair.co.uk](mailto:sales@marvair.co.uk).

#### **16. Who is Marvair?**

In 1947, the Marvair Heat Pump Division of Muncie Gear Works built one of the world's first water source heat pumps. Marvair became an independent company in 1972. We design and manufacture HVAC (heating, ventilating and air conditioning equipment) for a variety of applications including, schools, telecommunications facilities and residential water source heat pumps. In 2001, we entered the marine market with a complete line of self contained and split system reverse cycle air conditioners.

Marvair is part of the Airxcel, Inc., a group of companies that specialize in building HVAC equipment and other products for the recreational vehicle and leisure markets. RV Products Inc., an Airxcel company, manufactures the Coleman brand of air conditioners for RV's. As a group, Airxcel builds over 200,000 air conditioners each year.

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